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Notes on *GRAPTAS C-AUREUM* and *INTERROGATIONIS*.—Feb.

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Until the publication of Mr. Lintner's paper in Trans. Amer. Ent. Soc., 1869, these two species had been treated by late authors as identical, some describing one and some the other, or sexes of either, under the names *C-aureum* and *Interrogationis* indifferently. Our collectors had accepted without much question, the statement of Boisduval and Leconte, which is in effect, that although there would seem to be more than one species, yet as the caterpillars are the same, the butterflies must be the same also.

The first mention of a *Papilio C-aureum* is in Linnæus, Syst. Nat. 1760, I, p. 477, as follows; "*C-aureum*. P. N. alis angulatis fulvis nigro maculatis; posticis subtus C-aureo notatis. Habitat in Asia."

This species is now recognized as equivalent to *Angelica*, Cramer, pl. 388, an Asiatic species found in India and Japan, materially and unmistakably differing from any American *Grapta*. Though, be it noted that the above indefinite description applies to either of our large species, or indeed, excepting the silver mark, to any *Grapta* then or now known.

In 1775, Fabricius, Syst. Ent. page 506, describes *C-aureum* nearly in same words; viz, "*P. alis dentato-caudatis, fulvis, nigro-maculatis; posticis subtus C-aureo notatis. Habitat in Asia.*" and refers to Linnæus.

In 1781, Fabricius, Sp. Ins. II, p. 94, again describes *C-aureum* in same words, with same reference to Linnæus and habitat, but refers also to Cramer, II, pl. 19, fig. E, F. Cramers figures purport to represent an American species, which may properly be considered as the one had in view by Fabricius, although there was error in his reference to Linnæus and in his habitat, caused naturally by the vague description of Linnæus.

In 1797, Abbot (Insects Georgia), figured without description as *C-aureum* the species before given by Cramer.

Mr. Lintner determines that both Cramer's and Abbot's figures represent the male of that one of these two species which has a red upper surface and much falcated forewings, in contradistinction to that with black hind wings, and slightly or not at all falcated forewings, which he calls *Umbrosa*. To avoid confusion, I will, for the present, speak of these as *C-aureum* (Fab.) and *Umbrosa*.

At first glance Abbot's figures seem to represent *Umbrosa*. But after careful comparisons with many individuals of both species, I think Mr. Lintner's conclusions correct. There is a great variation. Some *Interrogationis* have very dark brown hind wings, and may well have stood for Abbot's figures, which are coarsely executed. The outlines of both wings and falcation of fore wings, as Mr. Lintner points out, are those of *C-aureum*, not *Umbrosa*. On the under side the coloring is faithful to neither but nearest *C-aureum*. The same remarks will apply to Cramer, whose figures, also, are very coarse. In fact, nothing would be lost by rejecting all these figures.

In 1798, Fabricius (Supp't. p. 424), for the first time mentions and describes *P. Interrogationis*, viz; "alis caudatis fulvis nigro maculatis, subtus glaucis: striga punctorum nigrorum, posticis C-aureo notatis.

Habitat in America boreali.

Nimis affinis *P. C-aureo* at paullo major et alæ subtus glaucæ striga punctorum nigrorum."

Wings tailed, fulvous, spotted with black, beneath glaucous (i. e. a blue or green inclining to grey or white) with a transverse band (striga) of black points.* * * * * Extremely like *P. C-aureum* but a little larger and the wings beneath glaucous with a transverse band of black points.

Now Fabricius could not have said that his *Interrogationis* was "extremely like" *Angelica* Cramer, (that is, *C-aureum*, Linnæus,) for as stated, the two differ materially and unmistakably.

But the words *glaucæ striga punctorum nigrorum*, twice repeated, mark the importance attached to those characters. They were in fact the characters relied on as at once determining the new species from his *C-aureum*, thereby also determining this *C-aureum* itself, and with the words *paullo major* apply completely to the female of *Umbrosa*. This alone of the males and females of the two species can be called glaucous, that word well expressing the color by which the wings are suffused. To either sex of *C-aureum* the word is wholly inapplicable, the male being brown in varied shades and the female brown suffused

with ochraceous. And *Umbrosa*, of the two species, is the one distinguished in both sexes by a band of distinct black points crossing both wings. There are traces of such a band in the male *C-aureum*, (as there are in all *Graptas*) but the points are less conspicuous always and usually in part obsolete. In the female the traces are still fainter and the points almost always obsolete.

In the description of *Umbrosa*, by Mr. Lintner, these black spots are spoken of as pupils of rounded spots of lighter brown. I regard the "rounded spots" as no spots, but as the faintest halo about the black spots. Mr. Lintner speaks of these black pupils as distinct on the fore-wings in the male and female, expressly saying also that "in the female the rounded spots are obsolete, but the pupils are distinct," (the *striga punctorum nigrorum*); and that in the female of the other species (*C-aureum*) "these pupillated spots do not appear."

I conclude therefore, that *Umbrosa*, female, Lintner, is neither more nor less than the true *Interrogationis*, Fabricius, and that the former name can rank only as a synonym. For aught that appears the male was unknown to Fabricius.

In this conclusion I am sustained by Godart, so far as to the fact of the female of the one or the other of these species being the *Interrogationis*, Fab. In Encyc. Method., IX, p. 302, 1819, he says: "Fabricius has taken the male for *C-aureum* of Linnæus and has made of the female a separate species under the name of *Interrogationis*. And he gives as synonyms *C-aureum* Fab. male, *C-aureum* Cramer, and *Interrogationis* Fab. female. Then as the name *C-aureum* was preoccupied by Linnæus, and regarding all these forms as varieties of one species, he applies to them the name *Interrogationis*, Fab., and says, describing it, "Le dessous de male est d'un gris bois ondé et varié de brun;" (i. e., *C-aureum*, Fab. but by no means the true male of *Interrogationis* Fab.) le dessous de la femelle est brun et légèrement glacé de vert blanchâtre, surtout aux secondes ailes:" (♀ *Interrogationis* Fab.) Thus giving to the male of one species the female of the other.

On page 819, he further says of his *Interrogationis* ♂ "Le dessous est d'un brun noirâtre ou feuille-morte plus ou moins nuancé de gris violet." This describes a variety of *C-Aureum* ♂, which is sometimes flushed with purplish.

Boisduval and Leconte give a badly executed figure, composed, apparently of the upper surface of *C-aureum* and the under surface of *Interrogationis* Fab. ♂. The shape is rather that of the latter. It

is copied from one of Abbot's drawings, a poor copy of a poor original; but the under side is not to be mistaken.

The accompanying description mixes the species and sexes surprisingly. Closely following Godart, they say, "Le dessous des ailes est tantôt d'un gris de bois ondé et varié de brun," (♂ *C-aureum*) "tantôt d'une couleur ferrugineuse ou feuille-morte uniforme, avec l'extrémité un peu plus claire," (♀ *C-aureum*). "Jouvent brun, légèrement glacé de vert-blanchâtre, surtout aux ailes inférieures:" (♀ *Interrogationis*, Fab.) and add that in all the varieties there is a silver spot, sometimes in form of a C, and sometimes of an uninterrupted C or interrogation point. Here these authors seem to me to have also included *Grapta Comma*, Harris, then undescribed, as a third species, that species in many respects resembling the other two, and being distinguished by an uninterrupted C, a character unknown to me in the others.

Boisduval and Leconte further add, "This Vanessa varies much, and if we did not obtain from the same caterpillar (la meme chenille) the varieties of which we have spoken, we could easily make three species;" here, again, I suppose, alluding to *Comma*.

Dr. Harris describes *Interrogationis*, 2nd Ed. Ins. Mass. p. 298, as having the hind wings in the male most often black above, except at base, and sometimes of this colour in the other sex also; under side of the wings in some rust red, (*C-aureum*) "in others marbled with light and dark brown, glossed with reddish white," (♂ *Interrogationis* Fab.)

Dr. Harris therefore considered the male *Interrogationis* Fab. as the type, and the male *C-aureum* as a variety, and the female *C-aureum* as the type, and the black female a variety.

However, in what manner authors subsequent to Fabricius regarded these species has no direct bearing upon the main question, which is—did Fabricius properly distinguish them or either of them? Certainly he did. He was unacquainted with the male of his *Interrogationis*, but his description of the female was precise, and the language used proves that he had not in mind this male when he referred to *C-aureum*. His *C-aureum* was without a band of black spots, and was what he considered to be Cramer's *C-aureum*. That the latter was intended to represent the male of the other species is the opinion of Lintner and, I think, with reason.

If Mr. Lintner is right on this point, then, inasmuch as the name *Interrogationis* was applied by Fabricius to the female of the black winged species (*Umbrosa*), that is now the true specific name.

If he is wrong, and the figures of Cramer and Abbott may be supposed to represent the male of *Umbrosa*, then to this male Fabricius applied the name *C-aureum*; which being pre-occupied, his subsequent name, *Interrogationis*, covers both sexes and the species.

My conclusion is this: in one case, the red winged species is still unnamed, in the other its name, (*C-aureum*), is pre-occupied. I therefore propose to call it *Fabricii*, in honor of the great naturalist.

The synonyms of the two species will then be as follows, viz.:

G. INTERROGATIONIS, Fab. Suppt. p. 424 ♀.

Godart Enc. IX. p. 302 ♀.

Harris Ins. Mass. Text ♂ ♀.

C-aureum,

Bois. and Lec, plate ♂ text ♀.

Umbrosa, Lintner, Trans. Am. Ent. Soc. 1869 ♂ ♀.

G. FABRICII, Edwards.

C-aureum Cramer II. pl. 19 ♂.

Fab. Sp: Ins. p. 94, No. 410 ♂. Ent. Syst. III. p. 78, No. 243.

Abbot, Ins. Ga. ♂ pl. 11.

Bois and Lec, text.

Interrogationis, Godart, Enc. IX. p. 302 ♂.

Ibid p. 819, ♂ Var.

Harris, Ins. Mass. 2nd Ed. plate.

Lintner, Ab. Cit. Trans. Am. Ent. Soc. 1869.

G. FABRICII, described as follows:

Form alike in both sexes; primaries strongly falcated, much incised; secondaries have a prominent tail, anal angle prolonged.

Male; expands 2.5 to 2.7 inches; Upper side bright red fulvous, the terminal third of primaries and whole of secondaries obscured by ferruginous; a common sub-marginal series of small fulvous patches. Primaries have upon the disk five rounded black spots, disposed in a right angle, of which the two smallest are in the cell and three transverse to these in the interspaces; in the upper part of first median interspace usually another spot of fainter color; a large, sub-quadrate spot depending obliquely from the costa, covering the arc; near apex two black or blue points. Secondaries have fulvous patches on costa and at origin of first and second median nervules; a large, bi-lobed, black spot on costal margin, a small spot near base of second subcostal nervule and another at base of second median; hind margin of both wings and abdominal margin at the fold largely edged with lilac; fringes short, fuscous.

Under side wholly clouded or mottled with shades of brown and ferruginous, sometimes partially suffused with purplish; the basal space limited by a ferruginous line, the course of which, on primaries, is angular, on secondaries, undulate, turning in at the cell and extending far down the abdominal margin, broadly bordered within by ferruginous and cinereous; enclosed in the basal space a few patches of darker color, especially on costal margins; on primaries three small spots at base of cell; outside the ferruginous line a narrow, unclouded space, beyond which, on primaries, the limb is mottled with ferruginous and ochraceous; a sub-apical blue-grey patch, inclining to white, on costa; inner angle tinged with lilac; along the incision a row of metallic blue streaks and points, continued on the whole margin of secondaries, often nearly obsolete; a common submarginal row of five black points, more or less obsolete, or only distinguishable by a glass, and partially edged by blue scales; costal edge ferruginous, beaded by rounded yellow spots, between which and the costal nervure the ground is yellow, irrorated with ferruginous. Secondaries have a ferruginous, nebulous, subapical patch, and a stripe curving from the upper median nervule towards anal angle; silver spot an interrupted C; the hind margins of both wings much covered by fine, abbreviated, ferruginous streaks.

Body above fulvous, covered on thorax with greenish hairs; beneath grey ferruginous; legs buff; palpi buff, on upper side fulvous; antennæ fuscous above, annulated below with buff; club fulvous tipped with buff.

Female expands 2.6 to 3 inches. Upper side in color and markings similar to male. Under side brown, suffused with ochraceous, deeply along hind margins; the disk sometimes slightly tinged with purplish; the whole surface covered by fine ferruginous streaks; the basal space limited as in the male, enclosing spots similar but faintly colored; the submarginal row of black points obsolete or represented by two or three points at outer angles only, and in all cases minute; margin at apex and inner angle, and, on secondaries, the tail and abdominal margin slightly washed with lilaceous.

This species differs from *Interrogationis* in many respects and closely resembles it in others. It differs in shape of wings, they being more falcated, more incised; the hind wings have a longer tail and more prominent anal angle; the color is more red, and the hind wings are red instead of black; the fringes are fuscous instead of white; the margins are largely bordered by a bright lilac, while those of *Interrogationis* are but slightly edged with a dull grey. Beneath, the male of

Fabricii is mottled with brown and ferruginous, whereas, the male of the other species is mottled or marbled in various colors, ferruginous, cinereous, grey, yellow, brown and purple. There are also differences in the markings of costa of primaries on under side, and in the common submarginal spots, these last being conspicuous in one species and obsolete in the other. The color of under surface of *Fabricii* ♀ is brown suffused with ochraceous, that of *Interrogationis* ♀ brown suffused with blue grey.

On the other hand, the two species are alike in size in both sexes, and in the markings of fore wings, and in hind wings also, so far as those are not obscured by black. On the under side the pattern is very nearly the same, though the colors differ. The legs, palpi, and antennæ are the same.

And here I will notice the remarkable resemblance between these species and *G. Comma*, which combines the characters of the other two. The largest specimens of *Comma* are equal in size to the smallest of the others; the form is sometimes that of one, sometimes of the other, varying much in falcation and length of tail; the color of upper side is between the two; the spots precisely the same; on the under side the same words would describe the males of *Comma* and of *Interrogationis*, varying only the shades of color. The lines, basal space, spots, dots, patches, stripes and metallic marginal spots are all the same except in color. Moreover, individuals of *Comma* are not unusual in which the silver spot is an interrupted C as in the other species. I have no doubt, as before said, this species was formerly considered as a variety of *Interrogationis*.

(We have also a fourth species nearly allied to *Comma*, hitherto undescribed, to which I have given the name of *Dryas*, intending to publish a full description in the current volume of these "Transactions." The upper surface of the male is much like that of *Interrogationis* male, the hind wings being black. The under side very much resembles *Comma*, but shades of yellow predominate in the coloring. The silver C is very slender. The under side of the female is readily distinguished from all the species by its yellow hue, which is pretty uniform, though densely covered with ferruginous streaks. This species I have several times taken or bred from the larva, at Coalburgh, and it will probably be found wide spread, though, perhaps, no where common.)

All three are abundant in West Virginia, and for several seasons I have had opportunities of watching them in every stage of develop-

ment. All feed upon the same plants, elm, hop, nettle, ambrosia, and, at the same time, the eggs and the young larvæ of each species in every stage of growth, may usually be found. But I have several times noticed that the larvæ of uniform size, or the eggs deposited on one or two successive days on a particular plant, produced one species only. For example, on the 7th of June, 1869, I found on the hop a number of larvæ from one day to one week old and several eggs. The latter were about $\frac{1}{10}$ of an inch in diameter, green, melon shaped, ribbed vertically and depressed at either end; gummed at one end to the leaf. Under a glass the ribs were prominent—vitreous. As the eggs matured the color became a bottle green. They were fastened indifferently to any part of the leaf or stem, the only preference being for young leaves. Frequently two or more were found one standing on the end of the other, perpendicular to the leaf. Several times three were so found, and, in one instance, four. After the larvæ emerged the ribs of the eggs resembled threads, the intervening colorless membrane being broken.

The larvæ, at first, were black, $\frac{1}{10}$ inch long, covered with black hairs and short spines. After first moult length $\frac{3}{10}$, color still black, but one transverse set of spines, near each extremity, were reddish yellow. With the next moult the color became black, striped longitudinally with red, and with yellow streaks and dots at base of spines. These last were in seven rows, many branching, red, or yellow red tipped with black, except those on first two and last segments which were wholly black; this phase continued to maturity, although there were variations in the color of the spines and in the relative preponderance of black or red. Length, when mature, two inches.

Between the 26th and 30th of June 23 of these larvæ had produced imagos, every one of which was of *Interrogationis*—13 ♂ 10 ♀.

From the 7th to 21st of August, I found many more eggs and many larvæ, and on the 21st was fortunate in seeing a female *Interrogationis* deposit an egg, from which, in due time, I obtained the imago.

The larvæ of *Fabricii* were, likewise, black at first moult; black, with two bars of red and yellow spines at second, but thenceforth distinctly varied, becoming russet, or reddish specked with fine yellow papillæ, so much specked often as to make the general color rather yellow brown, than red brown; the spines sometimes whitish, sometimes whitish at base and red at tips, with, in all cases, those at the extremities red.

From these speckled larvæ came 8 ♂ 11 ♀ *Fabricii*. From black

striped larvæ came 3 ♂ 3 ♀ *Interrogationis*. But from striped larvæ, in no way distinguishable from the latter, came 1 ♂ 2 ♀ *Fabricii*, and from speckled larvæ came 1 ♂ 1 ♀ *Interrogationis*.

So that it appears while the striped larvæ usually indicate *Fabricii* and the speckled *Interrogationis*, there are cases exactly the reverse. In previous seasons I had found the same result. I am not sure that there was any difference in the shape of the eggs of the two species, though sometimes I thought I discovered that those of *Interrogationis* were equally large at either end, those of *Fabricii* were largest at base. But I had not a glass of sufficient power to settle the point.

The chrysalids of the two species I was unable to distinguish. They are well described by Dr. Harris as "ashen brown, with the head deeply notched and surmounted by two conical ears, a long and thin nose-like prominence on the thorax, and eight silvery spots on the back." Except in shades of color, some being more ashen and some more brown, I could distinguish no difference. This is more noticeable because the characteristics are conspicuous. It was on account of these resemblances that Boisduval and Leconte considered the two species as one. Yet, without any doubt, they perpetuate their kind, and are to be judged specifically distinct.

The larvæ of *Comma* bear no close resemblance to those of the two larger species, and the chrysalids are quite distinct; which is remarkable, considering the resemblance of the butterflies. The three species together with *Dryas* may be regarded as having sprung from a common type, very near to or identical with *Interrogationis*, from which *Comma* and *Dryas* first diverged, to be followed by *Fabricii*, the latter not yet wholly separated from the parent stem, as the similarity of the chrysalids and the occasional interchangeable forms of the larvæ show.

I intend figuring all these species with the larvæ in a subsequent number of the Butterflies of North America, and shall be obliged for any assistance lepidopterists can render me in making their history more exact and complete.